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## ABSTRACT

This manual provides information needed to meet specific standards for certification as a pesticide applicator. The text is concerned with the storage insects, soil insects and fungi which are the major kinds of seed pests. Chemical and nonchemical control measures and the labeling and coloring requirements for treated seed are also discussed. Safety and environmental precautions are outlined. (CS)

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# Iowa Commercial Pesticide Applicator Manual

## CATEGORY 4

## SEED TREATMENT

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This manual is to be used for certification training in conjunction with the U. S. Department of Agriculture - U. S. Environmental Protection Agency manual, **Apply Pesticides Correctly**, EPA-335.

Cooperative Extension Service  
**IOWA STATE UNIVERSITY**

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This manual has been developed for individuals wishing to become certified in commercial pesticide applicator category 4, Seed Treatment. It contains specific information that an individual must know before becoming certified in category 4. The manual has been designed to supplement the general information contained in the core manual, Apply Pesticides Correctly - A guide for commercial applicators (plus an Iowa State University supplement) and should not be used for certification preparation without referring to the core manual as well.

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## INTRODUCTION

Seed treatment, as defined by the Federal Seed Act, means: ". . . given an application of a substance or subjected to a process designed to reduce, control, or repel disease organisms, insects, or other pests which attack seeds or seedlings growing therefrom." It includes control of pests while the seed is in storage and after it has been planted.

A person treating seed should know:

- the kinds of seeds which should be treated
- the kinds of common insect pests and diseases
- the correct use of seed treatment pesticides

The kinds of pesticides used vary according to locality. Get specific information from your local Cooperative Extension Director or the pesticide manufacturer. Registered chemical products are effective and safe when used as directed.

Match each seed treatment pesticide with equipment that can apply it correctly. The manufacturer can provide you with information on how to use and maintain the equipment.

## SEEDS COMMONLY TREATED

The kinds of seeds usually treated include:

- alfalfa
- barley
- field corn and sweet corn
- oats
- rye
- sorghums and sorghum-Sudan grass hybrids
- soybeans
- sugar beets
- sunflowers
- wheat

## SEED PESTS

Major kinds of seed pests are:

--fungi and bacteria  
(such as seed rots,  
seedling blight, and  
smuts of grains),



Seed Blight



Barley Smut

--soil insects  
(such as the seed-  
corn beetle and  
wireworms), and



Seedcorn Maggot



White Grub

--storage insects  
(including weevils,  
moths, and beetles).



Saw-toothed Grain Beetle



Indian Meal Moth

#### NONCHEMICAL CONTROL OF PESTS

Although most seed protection is done with chemicals, nonchemical methods may also be helpful:

- use of plant and crop varieties whose seeds are resistant to pests, i.e., small grain resistance to smut,
- use of low humidity and low temperature in storage areas to inhibit the growth of insect pests, i.e., moving stored grain to eliminate hot spots,
- use of good sanitation practices (such as removing waste seed and seed particles from the storage area) to reduce food and shelter for pests and emptying augers where insects hide.

#### CHEMICAL CONTROL OF PESTS

There are three types of chemical treatments for seed diseases and insects:

- Seed surface disinfestation--complete covering of the seed with a pesticide which kills spores and other disease agents on the surface of the seed. It does not provide residual protection from diseases and insects.
- Seed protection--applying a pesticide to the seed to protect the seed and young seedling from disease agents or insects in the soil or in storage.
- Systemic treatment--applying a pesticide which penetrates the seed and/or extends into the plant as it grows. It repels or kills certain types of fungi or insects, or keeps them from causing damage.

#### SEED TREATMENT FORMULATIONS

##### Pesticide Labels

Before using any seed treatment pesticide, read and understand the information on the label. The label provides important information including:

- type of seed the pesticide can be used on
- application rate
- pests the product will control
- care in handling and use of treated seed

The label also lists the active and inert ingredients of the product.

#### Active Ingredients

The label gives the names of all active ingredients and tells what percent of the formulation each makes up.

#### Inert Ingredients

Seed treatment pesticide formulations often contain carriers, binders, wetting agents, emulsifiers, suspending agents, and dyes. These materials are inert ingredients, which do not have to be listed individually on the label. They are added to the formulation to:

- improve appearance,
- increase coverage,
- increase adherence,
- prevent dusting-off,
- provide hazard recognition.

They have little or no effect on seed germination.

#### TYPICAL SEED TREATMENT PESTICIDE FORMULATIONS

|                    |                   |      |
|--------------------|-------------------|------|
| Active Ingredient: | Chemical Name     | 80%  |
| Inert Ingredients: | Wetting Agent     | 3%   |
|                    | Dyes              | 2%   |
|                    | Suspending Agents | 3%   |
|                    | Carriers          | 6%   |
|                    | Stickers          | 2%   |
|                    | Oils              | 4%   |
| Total:             |                   | 100% |

#### Compatibility

Most seed treatment pesticides are compatible when mixed together. Consult the pesticide label or the pesticide manufacturer for compatibility information. Check compatibility information before applying a pesticide to inoculated seed. To test compatibility, make a small slurry mixture of the materials in the correct ratio before starting the actual mixing.

## APPLICATION EQUIPMENT

Commercial seed treaters are designed to apply accurately measured quantities of pesticides to a given weight or volume of seed. Too much of a pesticide may injure seed, and too little is often not effective.

To perform accurately, a seed treater:

- must be adjusted correctly at all times, and
- must be given continuous preventive maintenance.

Check often during use to see that the amount of formulation that has been used is in the correct proportion to the amount of seed that has been treated.

There are three basic types of commercial seed treaters:

### Liquid Treaters

Liquid treaters are used for all formulations not requiring agitation during application.

Advantages:

- no agitation needed,
- pesticide can be pumped directly from pesticide container into equipment,
- machines require less space than other types,
- give good seed penetration.

Limitations:

- limited to liquid pesticide formulations,
- useful mainly on small grains,
- require a fume collection system.

### Slurry Treaters

Slurry treaters are used for formulations requiring agitation during application.

Advantages:

- can be used to treat many seed types and varieties,
- give good coverage and are accurate,
- are economical.

Limitations:

- pesticides used need vigorous and continuous agitation,
- require a dust and/or fume collection system,
- limited to wettable powders or emulsifiable concentrates.

Dust Treaters

Dust treaters are used for dry formulations.

Advantages:

- add no moisture to the seed.
- easy to clean and operate.

Limitations:

- limited to dust formulations,
- sometimes inaccurate,
- dust drifts easily.

The operator's manual supplied by the manufacturer will guide you in the correct use and maintenance of the equipment.

COLORING TREATED SEED

Food and Drug Administration regulations require that all food grain seeds treated with seed treatment pesticide formulations be dyed to prevent their use as food or feed.

Most seed treatment pesticides for in-plant use come from the manufacturer with the color added. Coloring is not required to planter-box formulations. Some seed processors prefer to add more dye to get the color they want. Dyes approved for this purpose have little or no effect on seed germination and present little or no danger to people who process or use the seed.

LABELING TREATED SEED

The Federal Seed Act regulates the labeling of treated seed. (See Appendix.) The following information, in type no smaller than 8 points, is required on treated seed containers.

- A statement indicating that the seed has been treated.
- Name of the seed treatment pesticide used--either the common name, chemical (generic) name, or abbreviated chemical name.
- Seed treated with highly toxic substances (See Table 1) requires a label bearing a skull and crossbones and a precautionary statement, such as "This Seed Treated With Poison." The skull and crossbones must be at least twice the size of the type on the label. The precautionary statement must be in red letters on a contrasting background.

**THIS SEED TREATED WITH  
POISON**  
Treatment Used: Phorate



The production of organo mercurial pesticides for seed treatment was prohibited by the Environmental Protection Agency on February 17, 1976. However, stocks formulated prior to that date may be sold and used until exhausted.

- Seed treated with most substances not on the highly toxic substances list requires a label with an appropriate precautionary statement, such as "Do not use for food, feed, or oil purposes", if the substance remaining with the seed is harmful to humans or other vertebrate animals.

**This Seed Treated With Captan**  
**Do not use for food, feed or oil**  
**purposes**

The following pesticides are not considered harmful when present at rates less than the number of parts per million indicated:

|                    |                          |
|--------------------|--------------------------|
| allethrin          | 2 ppm                    |
| malathion          | 8 ppm                    |
| methoxychlor       | 2 ppm                    |
| piperonyl butoxide | 8 ppm (oats + sorghum)   |
|                    | 20 ppm (all other seeds) |
| pyrethrins         | 1 ppm (oats + sorghum)   |
|                    | 3 ppm (all other seeds)  |

Federal Seed Act regulations list the treatment substances and rates of occurrence for which no warning statement is necessary.

This information may appear on a separate tag or seed analysis tag, or it may be printed conspicuously on the side or top of the seed container. These are minimum labeling requirements. Some seed treatment pesticide labeling recommends additional information that should be added to the label on the treated seed. You should also check for state of Iowa's requirements for these treated seed container labels.

#### SAFETY AND ENVIRONMENTAL PRECAUTIONS

Some suggested precautions for seed treatment include:

- The seed treatment area should have an approved exhaust and dust-collecting system to remove toxic vapors and dust. Do not allow pesticide dust or fumes to reach unprotected employees or to reach commodities to be used for food, feed, or oil purposes.
- To avoid contaminating seed with an incorrect pesticide, the seed treating equipment must be thoroughly cleaned before the treating process begins. Consult the pesticide manufacturer for the names of cleansers and directions for their use.
- Do not run water containing pesticides into a stream or public sewer. Handle it as you would an excess pesticide. Check with Department of Environmental Quality when you have large amounts of such waste water.
- Dispose of empty treated seed containers and unused treated seed as you would excess pesticides. Contact the Department of Environmental Quality or local sanitary landfill operators for requirements and disposal areas.
- Special tightly woven bags, or polyethylene or foil-lined bags, are recommended for seed that has been treated with some highly toxic pesticides.
- Handle treated seed in accordance with instructions on the label of the pesticide that was applied to the seed.

- Store treated seed in labeled containers away from unprotected persons and food or feed products. Treated seed must never be mixed with food and feed products.
- Provide customers with copies of pertinent labeling information for the pesticide applied.

Table 1. List of Highly Toxic Pesticides That Require a Skull and Crossbones and a Precautionary Statement

|                                                      |                       |
|------------------------------------------------------|-----------------------|
| aldrin, technical                                    | endrin                |
| demeton                                              | ethion                |
| diazinon                                             | heptachlor            |
| dieldrin                                             | mercurials, all types |
| p-dimethylamino-<br>benzenediazo<br>sodium sulfonate | parathion             |
| di-syston                                            | phorate               |
|                                                      | toxaphene             |

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